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Sub. B1

1. A fluid dispenser for dispensing a fluid onto a substrate comprising:

a dispensing valve movable between open and closed positions for controlling a flow of the fluid from said fluid dispenser;

a solenoid, the operation of said solenoid being effective to cause said dispensing valve to move between the open and closed positions;

a power supply having an output voltage; and

a driver circuit electrically connected to said solenoid and said power supply and providing an output signal to said solenoid having a time variable component determined by the output voltage of said power supply.

anticipated by 09/880,649 claim 1

any AC operated solenoid

2. The fluid dispenser of claim 1 wherein said driver circuit provides the output signal with a time variable component automatically varying as a function of the output voltage of said power supply.

3. The fluid dispenser of claim 2 wherein said driver circuit provides the output signal with a time variable component having a duration automatically varying as an inverse function of a magnitude of the output voltage of said power supply.

4. The fluid dispenser of claim 3 wherein said waveform generator provides a waveform signal having an initial peak current with a variable duration followed by a hold current to energize said solenoid, and said waveform generator provides the initial peak current with a duration determined as an inverse function of the output voltage of said power supply.

5. A driver circuit for an electrically operated fluid dispenser dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser and a solenoid operatively connected to said dispensing valve and capable of moving said dispensing valve between the open and closed positions, the driver circuit comprising:

a power supply having a voltage;

a control circuit connected to said power supply and providing a drive signal as a function of the voltage of said power supply, and

a power switch connected to said power supply and providing an output signal to said solenoid as a function of the waveform signal.

6. The driver circuit of claim 5 wherein said control circuit provides an initial peak current with a variable duration followed by a hold current to energize said solenoid, and said control circuit providing the initial peak current with a duration determined as a function of the voltage of said power supply.

7. The driver circuit of claim 6 wherein said control circuit provides the initial peak current with a duration varying as an inverse function of the voltage of said power supply.

8. The driver circuit of claim 6 wherein said control circuit provides the hold current as a function of a feedback signal representing the hold current being supplied to said solenoid.

9. The driver circuit of claim 8 wherein said control circuit further comprises:

a current sensor providing a feedback signal representing current provided to said solenoid; and

a comparator providing an error signal to said control circuit representing a difference between the waveform signal and the feedback signal, the error signal causing said power switch to operate in a manner driving the error signal to zero.

10. The driver circuit of claim 5 wherein said control circuit further comprises a peak current duration control providing an output waveform signal having a duration varying as a function of the voltage of said power supply.

11. The driver circuit of claim 5 wherein said power supply is a regulated power supply.

12. A pneumatically operated fluid dispenser for dispensing a fluid onto a substrate comprising:

a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser;

a piston assembly operatively connected to said dispensing valve and capable of moving said dispensing valve between the open and closed positions;

a source of pressurized air;

a solenoid valve fluidly connected between said source of pressurized air and said piston assembly;

a power supply having a voltage; and

a driver circuit electrically connected to said solenoid valve and said power supply and providing an output signal to said solenoid valve having a time variable component determined by the voltage of said power supply.

13. A fluid dispenser for dispensing a fluid onto a substrate comprising:

a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser;

a solenoid having a coil in electromagnetic communication with an armature being movable through a displacement by energizing said coil, the operation of said solenoid being effective to cause the dispensing valve to move between the open and closed positions;

a power supply having a voltage connected to the coil, the time required to move said armature between said two positions varying in a first nonlinear relationship as a function of changes of the voltage of said power supply; and

a driver circuit electrically connected to said coil of said solenoid and said power supply and providing an output signal to said coil, the output signal having a variable component with a time duration varying in a second nonlinear relationship as a function of changes of the voltage of said power supply, the first and second nonlinear relationships being generally similar.

14. The fluid dispenser of claim 13 wherein said driver circuit comprises devices being adjustable to make the second nonlinear relationship substantially identical to the first nonlinear relationship.

15. A fluid dispenser for dispensing a fluid onto a substrate comprising:

a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser;

a solenoid having a coil in electromagnetic communication with an armature movable through a displacement by energizing said coil, the operation of said solenoid being effective to cause said dispensing valve to move between the open and closed positions;

a power supply having a voltage connected to said coil; and

a driver circuit comprising

a peak current duration control connected to said power supply and providing a signal varying as a function of the voltage of said power supply,

a pulse width modulator ("PWM") control connected to said peak current duration control,

a PWM connected to said PWM control and providing a PWM signal having a peak current with a duration varying as a function of the voltage of said power supply, and

a power switch connected to said power supply and responsive to the PWM signal for providing an output signal to said coil of said solenoid having a peak current with a duration varying as a function of the voltage of said power supply.

Sub. B2

16. A method of operating a fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, a solenoid having a coil in electromagnetic communication with an armature being movable through a displacement by energizing the coil, the operation of the solenoid being effective to cause the dispensing valve to move between the open and closed positions; the method comprising:

providing a power supply having a voltage;

producing an output signal having a time variable component determined as a function of the voltage of the power supply; and

applying the output signal to the coil of the solenoid, thereby automatically changing the operation of the dispensing valve as a function of the voltage of the power supply.

17. The method of claim 16 wherein the time required to move the armature between the open and closed positions varies in a first nonlinear relationship as a function of changes of the voltage of the power supply and the method further comprises providing the output signal to the coil in a second nonlinear relationship as a function of changes of the voltage of said power supply, the first and second nonlinear relationships being generally similar.

18. The fluid dispenser of claim 17 further comprising adjusting the second nonlinear relationship to be substantially identical to the first nonlinear relationship.

Sub. B3

19. A method of operating an electrically operated fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve operatively connected to an electrically operated solenoid, the dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, the method comprising:

providing a power supply having a voltage;

producing an output signal having a time variable component determined as a function of the voltage of the power supply; and

applying the output signal to the electrically operated solenoid, thereby automatically changing the operation of the dispensing valve as a function of the voltage of the power supply.

20. The method of claim 19 wherein the output signal has an initial peak current with a variable duration followed by a hold current to energize the solenoid, and the method further comprises producing the initial peak current with a duration determined as a function of the voltage of the power supply.

21. The method of claim 20 further comprising producing the initial peak current with a duration varying as an inverse function of the voltage of the power supply.

22. The method of claim 20 further comprising:

producing a feedback signal representing current in the solenoid; and

producing the hold current as a function of the feedback signal.

23. A method of operating an electrically operated fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve operatively connected to an electrically operated solenoid, the dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, the method comprising:

producing a first output signal having a time variable component determined as a function of a first nominal voltage of a first power supply;

applying the first output signal to the solenoid;

producing a second output signal having a time variable component determined as a function of a second nominal voltage of a second power supply; and

applying the second output signal to the solenoid.